Internal Losses indicated on Entropy Diagram, and Reheat Factor.—When any form of steam frictional loss occurs within a turbine, the energy dissipated by friction is returned to the steam in the form of heat, and this addition of frictional heat produces an increase of entropy.

Similarly, when any interstage leakage loss occurs, the velocity generated through the leakage area is dissipated and returns to the steam as heat.

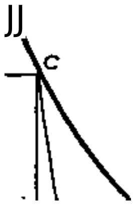

Fig. i.—Reheat Factor on TQ Diagram

Referring to the temperature entropy diagram (fig. i), CD represents the adiabatic expansion line; but if, at each stage of the machine, an increase of entropy occurs due to internal losses, the expansion line in an actual turbine becomes CK where the total internal losses are given by the area FCKL. The complete working cycle of the turbine is thus represented by the area ABCK, and the additional area CKD shows the extra heat available due to reheating of the steam. The ratio of this additional heat to the available adiabatic heat is known as the reheat factor of the turbine, and it usually varies in value from 4 to 6 per cent, according to the steam conditions and the internal efficiency of the turbine.

Internal Efficiency of Turbine shown on Moilier Chart.—The expansion of steam throughout a turbine can be clearly indicated on a Mollier chart. In all turbines of moderate output the expansion of the steam is divided into several stages, to each of which is relegated a definite heat drop. Thus, as example in fig. 2, the heat drop in the first stage is indicated by the line AB, the steam expanding from 200 Ib. to 55 Ib. If now all the losses of energy which occur in this stage be added together and scaled off as the length BD, the point D will represent the total heat contents at the end of the first stage; and projecting this point D horizontally to the pressure line of 55 Ib., the

point A! shows the position on the diagram representing the steam condition at the inlet to the second stage, 55 Ib. per square inch, 120° superheat.

A similar construction may now be adopted for each succeeding stage until the final exhaust condition E is reached. The total heat available throughout the turbine is thus given by the sum of the quantities (AB + A^ + &c.)